AMENDMENTS TO THE CLAIMS

Claims 1 through 21 (Canceled)

22. (Original) A device for controlling transport of magnetic beads between a position X and a position Y along a path P, the device comprising:

a plurality of current-carrying structures having a non-constant charge current density when conducting a current, said current-carrying structures being substantially electrically isolated from each other;

a current source configured to alternately provide a current to each of said current-carrying structures to generate a series of successive field minima of magnetic fields to which the beads are attracted forming the path P between the position X and the position Y, wherein said current-carrying structures are positioned sufficiently close together to generate said series of subsequent field minima of magnetic fields.

23. (Original) The device of Claim 22, wherein the current source comprises a switchable current supply connected to said current-conducting structures, said switchable current supply being configured to switch current supply between said current carrying structures at switching frequency.

24. (Original) The device according to Claim 22, wherein said current-carrying structures are disposed on a substrate by microelectronic process technology.

25. (Original) The device according to Claim 22, wherein said current-carrying structures vary in shape of their cross-section relative to the direction of current flow.

26. (Original) The device according to Claim 26, wherein the cross-section surface area of said current-carrying structure varies along the direction of current flow.

27. (Original) The device according to Claim 22, wherein said non-constant charge current density is generated by varying the width of said current carrying-structure along the direction current flow.

28. (Original) The device according to Claim 22, whereby said current carrying-structures characterized by a periodic shape, formed by a repetitive structural element.

29. (Original) The device according to Claim 27, wherein said structural element is characterized by an asymmetric mirror with respect to an axis that is orthogonal to the direction of current flow.

30. (Original) The device according to Claim 27, whereby the cross-section surface area decreases along the direction of the current, from one side of said structural elements to another.

31. (Currently Amended) The device according to Claim 22, wherein said current-carrying structures are isometric.

32. (Original) The device according to Claim 22, wherein the plurality of current-carrying structures consists of 2 current-carrying structures.

33. (Original) The device according to Claim 31, wherein said current-carrying structures are of substantially the same shape and size, and are stacked on top of each other, each being shifted by a distance different from 0 along the direction of current flow, such that currents are applied alternately to said current-carrying structures to generate successive magnetic field minima along and towards the end of said path P.

34. (Original) The device according to Claim 31 wherein the current-carrying structures are of substantially the same shape and size, and are positioned next to each other such that their respective current directions are parallel, and wherein both structures are shifted by a distance different from 0 along the parallel direction.

35. (Original) The device according to Claim 33, whereby the shifted distance equals half the length of the structural element.

36. (Original) The device according to Claim 28, whereby said structural element is sharkfin-like or triangular-like or sawtooth like.

Claims 37 and 38 (Canceled)

39. (Original) The device according to Claim 22, wherein the device is implemented in a biochip configured to transport, separate, and align beads and corresponding biospecimen.

40. (New) The device according to Claim 22, wherein said field minima are the result of the non-constant charge current density.